The Excavating Engineer

Vol. 18 JUNE 1924 No. 6

Heavy Rock Excavation Encountered in Highway Work in Iowa

A 70,000-yard Contract Involving 35,000 to 40,000 Yards of Solid Rock Handled on a 7% Grade by a Small Revolving Shovel

JASON D. JONES, well-known contractor of Cedar Rapids, Iowa, with field offices at Bellevue and Waukon, has recently completed in conjunction with Mr. Ed. Sash, also of Cedar Rapids, a $70,000 contract with the Iowa State Highway Commission in Jackson County on a section of the Bellevue-Maquoketa Road, known as Federal Aid Project No. 144.

Edward Sash of Cedar Rapids, Iowa, who took a hand in the bidding for the handling of the light grading, had for the work two elevating graders, two team outfits consisting of 60 mules, and one Holt and two Best tractors. Mr. Sash did all of the light grading on the job, while the rock excavation, which included a long heavy cut consisting for the most part of solid rock, was handled by Mr. Jones.

It is with the heavy excavation in connection with this contract that we will deal herewith.

The total excavation of this part of the contract amounted to approximately 70,000 yards, of which between 35,000 and 40,000 yards was solid rock, and the remainder, or approximately 30,000 yards, was earth. The contract price of the excavation amounted to $1.00 per cubic yard for the solid rock, $.75 for the loose rock, and $.245 for the earth. The overhaul amounted to about $20,000.

The contract was awarded in November, 1922, but actual operations were not under way until May, 1923.

Equipment Used

Jason D. Jones, who is well known in contracting circles throughout the state of Iowa, has a complete outfit of up-to-date equipment. He had for his work on the Bellevue-Maquoketa Road a Bucyrus 30-B steam shovel equipped with a 1-cubic-yard dipper and mounted on caterpillars, three seven-ton Plymouth locomotives, twelve four-yard, heavy-duty Western cars, and one No. 14 Sanderson-Cyclone blast hole drill. Later on, however, when Mr. Jones was awarded a contract for highway work extending from Lansing to Waukon and from Waukon to Postville, he found it necessary to increase his amount of equipment. He thereupon purchased two new Bucyrus 30-B machines, a new No. 50 Armstrong well drill and twenty-eight Eagle wagons.

Method of Operation

The Bellevue-Maquoketa contract, which was 12.2 miles long, amounting to about 30,000 yards of earth and about 40,000 yards of solid rock excavation, called for a road 28 feet in the cut with 7 feet on each side for a ditch, making a width of 42 feet from toe to toe of the slope. The fill is 30 feet wide on top.

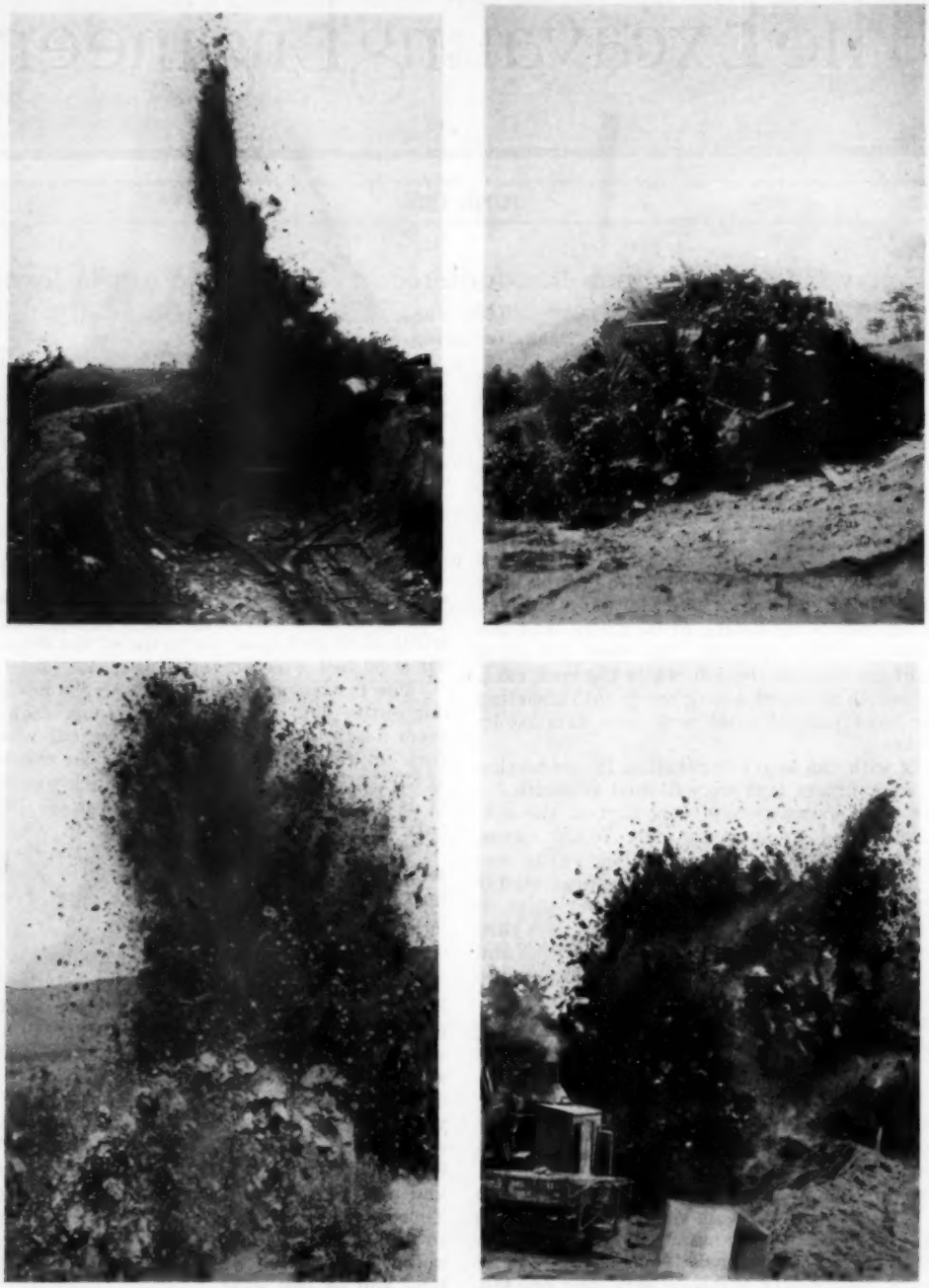
The excavation handled by Mr. Jones ran in one entire cut, about 1600 feet long, with maximum depth of 52 feet. The entire cut was solid rock on the bottom, and carried an overburden of earth, the deepest section of which was 20 feet. It is particularly interesting to note that this entire work was done on a 7% grade.

Owing to the uneven surface of the completed section, together with other conditions encountered, Mr. Jones decided to make use of locomotives and dump cars for haulage.

Ingenious Turn-Around for Dump Cars

With an inventive train of mind, he ingeniously devised a run-around, which could be moved ahead as the work progressed. As may be seen in the views, it was built on a movable frame, and was pulled ahead with the shovel. This operation generally took 15 to 30 minutes. Four-yard, heavy-duty Western cars negotiated the curve without difficulty. This method enabled the locomotive to haul three empty cars to the shovel and pick up the three that were left to be loaded. There were always three cars, therefore, waiting to be loaded. The frame weighed about 15 tons and was constructed entirely of timber, 135 feet long and 38 feet wide.

The average overhaul was 2600 feet. The total length of the job was 3950 feet, the cut being 1600 feet and the fill 2350 feet in length. The dump



A Page of Blasting Views—Jason D. Jones' Work

Of the 70,000 cubic yards that were handled on this job, approximately 40,000 yards of the material consisted of solid rock. Drilling ahead of the Bucyrus 30-B shovel was done by a No. 14 Sanderson-Cyclone blast hole drill. Holes were drilled several feet below grade on about ten by twelve-foot centers, and the whole depth was shot at once. From three to five tons of dynamite was used at a shot.

cars were in constant use, none of the material being overcast but all used for fill, which at its deepest point was 35 feet.

Shovel Operation

In spite of the continual face of hard rock which confronted the shovel, no serious breakdowns were experienced throughout the work, and the shovel moved as much as 900 cubic yards a day, the highest monthly output being 14,000 cu. yds.

At no time during the work was a double shift used. Until late in the fall a single shift of ten hours a day was employed, when it was changed to nine hours.

The only delays encountered during the work were due to blasting, which at times were ineffective, overtaxing the shovel considerably, and consequently keeping the output down to less than it might have been.

Method of Blasting

Every yard of the excavation required drilling and blasting. The Sanderson-Cyclone well drill which was used drilled holes several feet below grade on about ten by twelve feet centers, and the whole depth was shot at once. The average shot consisted of twenty to thirty holes, and from three to five tons of dynamite was used at a shot. In loading, the holes were double and sometimes triple decked with explosive. The shovel was equipped with an air compressor, and with the aid of an air hammer the large rocks left after the shot were broken up with little inconvenience.

The work described in this issue was finished, with the exception of some light grading, some time in December. Mr. Jones is now working on another contract, previously mentioned, near Waukon, where he is operating two Bucyrus 30-B steam shovels purchased at the time. He expects to finish this work some time this month.

The superintendent on the Bellevue-Maquoketa job described in this article is Chester Bittner, while Joseph A. Victor is operating and Walter Hinke is firing the 30-B.

The clean-cut manner in which Mr. Jones handled this contract is much to his credit, as it is his first large experience without being affiliated with another contractor. We foresee that he has a future before him in this part of the country. We ask our readers to watch his smoke.

Opening Up a Subdivision in Milwaukee

Description of C. F. Wussow's Grading Contract with John Mariner Estate, Milwaukee, Wisconsin

WITH the tremendous intensive growth that our larger cities have experienced during the past decade, there is a well-marked tendency to push the residential section farther and farther away from the roar of city traffic, encroaching bit by bit on the green fields of the surrounding country-side. The middle of this month will find those inhabitants of Milwaukee who are hungry for fresher air, warm sunshine, and room to expand, looking over the John Mariner Subdivision, out in that beautiful little section of Milwaukee known as Shorewood, and will find them buying 30-foot lots with all improvements in at $1500.00 apiece.

View of the Bucyrus 20-B Shovel Loading into a Mack Truck on C. F. Wussow's Grading Contract, Milwaukee, Wisconsin.

Less than fifteen years ago over these same green fields on a Saturday or Sunday afternoon, the elite of Milwaukee chased the elusive golf ball over the fairways of the Milwaukee Country Club, but the progress of Milwaukee northward has pushed far beyond the limit of this area, and the automobile and the street car has placed this section within easy access of the business center of the city.

A Fordson Tractor Was Used on the Work for Pulling the Scrapers

A short time ago it was decided by John Mariner, Realtor, prominent Milwaukee business man, that this land be platted and sold to those who were anxious to build in this section, and in

Another View of the Bucyrus 20-B Shovel After Taking a Dipper Load

September of last year, grading and the laying of sewage disposal and city water pipe lines was begun.

The contract for the grading was awarded to C. F. Wussow, a well-known contractor of Milwaukee who, with 25 years of experience back of him, is well equipped to do the work. There

Harvey A. Wussow (Left), the Superintendent on the Job and His Father, C. F. Wussow, Who Is One of the Best-known Contractors in Southern Wisconsin.

are few around Milwaukee who have had anything to do with earth excavation, who have not heard of that gentleman.

Work was begun, as stated before, in September 1923, and two shovels, an Osgood ¾-yard shovel and a Bucyrus 20-B ¾-yard shovel, began with the grading. Work continued into the fall and on to the latter part of December, when the extreme cold forced the shovels to shut down.

Work, however, was started again in March, and as this issue reaches the hands of our readers it will be nearing completion.

The hauling is being done with a fleet of ten trucks, two Mack, two Sterling, four Federal, and two Fordson mechanical hoist dump trucks which were built by the Milwaukee Parts Corporation of Milwaukee. The material is being hauled to a dump on the outskirts of the city where it is being used for grading purposes. Water is brought to the job in a 600-gallon tank mounted on a wagon chassis from a point not over a quarter of a mile from the work. Coal is brought to the shovels from the North Side Coal Company. It is expected that the work will be completed some time in June. Among other work recently done by C. F. Wussow and his crew, is the construction of several spurs from the Chicago & Northwestern Railroad and North Shore Lines for the Nash Motors Company plant at Kenosha, Wisconsin, where he had in operation his Bucyrus 20-B, 3 Fordson tractors and eleven teams. In June of last year he completed a 40,000-cubic-yard basement job in record time, and previous to that a 65,000-yard road job in northern Wisconsin.

The Shovel Crew — Reading from left to right are: George Malady who is firing the Osgood and W. H. Darragh who is handling the levers. Next is John Jeka, the fireman of the 20-B and Robert Burbach, the operator.

C. F. Wussow's son, Harvey A. Wussow, is the superintendent on the work. Their home is at 774 15th Street. Ernie Young is general foreman.

Operating the Bucyrus 20-B is Robert Burbach and John Jeka is firing, while W. H. Darragh is operating the Osgood and George Malady is firing.

Panama Dipper Dredge Performances

This article is to all intents and purposes a log of the big 15-yard dipper dredges which were used in battling the slides during that strenuous period between 1914 and 1916, when the real battle was fought. Although now an old story, we believe it will prove to be a valuable record of what is undoubtedly the most extensive dipper dredge operation the world has ever seen.

The Year 1914

THE year 1914 is a memorable one in the history of the construction of the Panama Canal. It was at this time that the problem of keeping the canal open to traffic loomed the biggest, and the task of clearing away the slides appeared in its most formidable light. Two 15-yard dipper dredges, the largest machines of the type ever built up to this time, had been ordered from the Bucyrus Company.

Both dredges were built and partially erected on the Hudson River at Newburg, New York, and towed to Colon. The "Gamboa" was the first to arrive on March 15th after a very stormy trip, and started digging at the base of Hogan's Slide, in what was then known as Culebra Cut, on April 3rd. The second dredge, the "Paraiso," arrived May 25th, and was put to work in rock near the south side of Gold Hill on Cucuracha Slide on June 6th. These two points had been found impracticable for the service and endurance of the lighter machines already on the Isthmus.

Although, on the arrival of these dredges, an open channel was in existence across the Isthmus, yet much remained to be done in the widening, deepening and keeping open of the Canal, particularly at those points immediately north and south of Gold Hill and Contractor Hill area, which points are directly opposite to each other, and comprising the Cucuracha, East and West Culebra Slides, an area as treacherous then as during the construction period. In fact, the time had arrived when the practical use of the older machines had vanished, as far as the above-mentioned locality was concerned, and which constituted the slide danger zone of that period.

The material encountered was mainly solid rock, an outcropping dike of trap, an unusually hard metallic rock, which had caused much difficulty to the shovels and drills during the construction period. Numerous boulders were encountered, the dredges each handling at times from a half to two dozen boulders weighing from 10 to 30 tons apiece during a day's work, of such size that they had to be blasted on the dipper before they could be placed on the scows.

It was mainly through the efforts of these dredges that the canal was opened to commerce on August 15, 1914.

On October 14 the canal was blocked by a slide. An estimate set October 22nd as the first day on which vessels could pass. The dredges, however, opened the canal two days before this

View of the fleet of Bucyrus 15-yard dipper dredges fighting the slide in the Gaillard Cut on the Panama Canal. This view gives an excellent conception of how the material broke off and slid into the cut. The dredge "Cascadas" (the furthest left) has dug 330,605 cubic yards of rock and earth in 29 days. In a period of 23 hours and 15 minutes it has excavated 23,305 cubic yards of hard material. This is an average of over 1,002 cubic yards an hour or 25 tons per minute. These outputs have never been excelled by any dipper dredge.

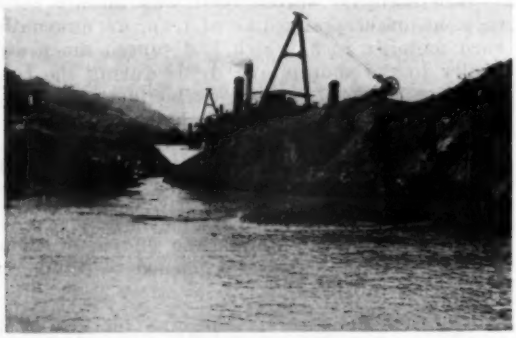
date. Geo. Goethals mentions this performance as follows:

"The performance of the forces in clearing the channel in two days less time than was believed to be necessary indicates the fitness of the equipment and the loyal persistence of the personnel."

The output of the dredges during this period is given below. The dredges were on a three-watch basis of eight hours each, being in operation during the entire twenty-four hours of each day.

1914

	15th	16th	17th	18th	19th	20th	Total Yardage
Gamboa	3935	5160	6175	6910	7800	5755	35735
Paraiso	4150	6900	7625	7600	6720	4975	37970



The photograph was taken near Gold Hill, the big hill shown in the view on page 219. It will be noted from this view how the mud was forced out of the water from the bottom of the canal by the pressure of the slides.

The report for the year ending December 31, 1914, gives the following performance for the "Gamboa":

Working time.....125 days, 5 hours, 55 minutes
Delay time.....143 days, 18 hours, 5 minutes
Total elapsed time.....269 days
Total yardage.....1,064,640 cubic yards
Average yardage per hour.....165 cubic yards
Average yardage per work hour...354 cubic yards
Average yardage per barrel fuel oil.80 cubic yards

The delays chargeable to the dredge proper, the engine room and the deck, amounted to 5.3% of total elapsed time.

1000-yard capacity scows were found to be the most suitable for these large dredges. However, as the 15-yard dredges got warmed up to their work, 350-yard scows had to be requisitioned to make up the deficiency in scows. These smaller scows, though excellent for the other machines were quite unsuitable for the 15-yarders. It was found that from 15 to 25% more material could be loaded in the same time when larger scows were used.

Great care had to be exercised in loading the small type. Unless the dipper was slowly and carefully lowered into the hopper, and practically lowered on top of the load as the pocket filled, a hopper chain was almost sure to break, causing the hopper to empty with the resulting loss of the yardage.

Much of the original digging was hard and irregular, due to the older machines having left rock, huge boulders and stiff clay behind which they were unable to handle.

The Year 1915

The year 1915 was notable for the big slide, the breaking of all previous output records by the "Paraiso," and the arrival of the third 15-yard Bucyrus dredge, the "Cascadas."

A big movement of the East and West Culebra Slides occurred in August.

An illustration of the dangers to which the dredges were exposed during such a movement is illustrated by the following incident: Both slides moved simultaneously, and before anyone was aware of the possibility of a complete closing of the prism, an island suddenly formed, forced upwards from the Canal bottom by the weight of the material coming into the canal.

A 20-inch suction dredge was put to work on this obstruction at the south end and a dipper dredge on the north. It looked like an all-night job, and both dredges settled down to their tasks. The obstruction was cleared away by 11:00 p. m. The soundings all around both machines gave a depth of 45 feet. They were waiting for instructions from the supervisor relative to their new excavating stations.

Suddenly the suction dredge began blowing her whistle and started to move out; this was taken by the dipper dredgemen to indicate victory. It was decided to move the dipper dredge. The spuds were hoisted and the dipper lowered so as to kick back. It was then discovered that there was only 20 feet of water where 45 feet existed five minutes before. All haste was made to get the dredge clear of the danger zone, but the machine had to be practically hurdled over the best part of 1000 feet before reasonably deep water was found. In an hour the island had reformed, and by morning a peninsula replaced the island.

A delay of 15 minutes would undoubtedly have stranded both dredges. The suction dredge whistle indicated that they had found the bottom rising behind them when least expected, and that they were pulling out to a place of safety.

On October 4th the "Paraiso" smashed all previous dredge records. This figure incidentally still stands as the highest day's output of this dredge:

Yardage in period.....17,185 cubic yards
Elapsed time.....24 hours
Actual digging time.....22 hours, 25 minutes
Yardage per hour elapsed time...716 cubic yards
Yardage per work hour.....766.5 cubic yards
Duration of cycle.....70.4 seconds

The location was not picked, digging was good, and the scows plentiful. At this time the full complement of 1000-yard scows had arrived.

The "Canal Record" for October 6th states that the actual difference between this record and the previous high output of the "Gamboa" is equivalent to a good day's work of one of the 5-yard dipper dredges.

It is interesting to note the output of this dredge for six days immediately preceding and following this record day, as indicative that this high output was merely part of the day's work with no bad after effects caused by undue strains. These outputs follow:

	Cubic Yards		Cubic Yards
Sept. 28	10,310	Oct. 5	10,285
Sept. 29	11,930	Oct. 6	6,490
Sept. 30	9,310	Oct. 7	12,740
Oct. 1	8,865	Oct. 8	10,465
Oct. 2	Repair	Oct. 9	9,190
Oct. 3	8,255	Oct. 10	10,315
Oct. 4	17,185		

This shows an average of 9,642 cubic yards per day for the thirteen days, which includes one day with no yardage, or 10,445 yards per day for the twelve working days.

The rivalry between the crews of the dredges was intense at all times. Following this high day's record by the "Paraiso," it was decided to give the "Gamboa" a chance to better this mark. The "Paraiso" at this time happened to be in good digging. In an attempt to even up scores, the "Paraiso" was pulled out of her favorable location, and the "Gamboa" now fitted with a 15-yard dipper was put in this better digging. She failed. The larger dipper would not fill and less yardage was obtained than with a 10-yarder. This was a lesson but it was not bewailed by the "Gamboa's" crew, as they did not like the idea of being privileged by being given a better location for the avowed purpose of beating their rival.

The "Gamboa," however, had her turn later on. This time the "Paraiso" was given the advantage. This dredge had never been able to beat the "Gamboa's" monthly yardage; much good-humored banter was constantly being exchanged by the two crews. On this particular month only 1000 cubic yards separated the two dredges on the last day of the month.

The "Gamboa" had the best of the digging, while the "Paraiso" was in a rock bottom between

Lifting a 50-ton boulder with the Bucyrus 15-cubic-yard dipper dredge "Paraiso" on the Panama Canal. This boulder had to be blasted three times while it was resting on the dipper before it was considered safe to place it on the scow. Some realization of the power of this dredge may be gained from the knowledge of the fact that the operator of the dredge did not know he had the boulder until it appeared above the water.

Gold and Contractors' Hills. At 6 p. m. the dredges were switched, causing much comment among the men. By 9 p. m., however, the "Paraiso" got mixed up with boulders and clay, while the rock which the "Gamboa" was in "flivvered" out. The "Gamboa" won, much to the rejoicing of its crew.

The "Cascadas," the third 15-cubic-yard Bucyrus dipper dredge, was contracted for under date of January 15, 1915. The Governor's report for the preceding year contains the following in this connection:

"And as the 'Gamboa' and 'Paraiso' have given such satisfactory results, a dredge of the same type, modified as experience indicated necessary and desirable, was contracted for under date of January 15, 1915."

This boat went into commission on October 31st.

Her principal improvements over the "Gamboa" and "Paraiso" were as follows: A wider hull; forward spuds hoisted from a gallows frame; three main boilers instead of two; a portable crane for facilitating repairs in engine room and non-reversible main engines.

In brief the reasons for these changes were as follows:

The wider hull was to insure greater safety.

The change in spud hoist saved bottom sheaves, the cables and the hull from wear and strain.

The extra boiler, to avoid the necessity of laying the dredge up periodically to wash the boilers out. One boiler was thus out of commission at all times, a period of fourteen days being allowed for cleaning each boiler, thus giving each boiler a month's continuous service. The main engines were made non-reversible because their type was more suitable and nothing was found to be gained by the original type.

In spite of the above changes all parts, even to the smallest, were made interchangeable with the other two boats, except, of course, the spud cables.

The "Cascadas" started with great prophesies and expectations. For the remainder of the year, however, no records were broken. The comparatively low outputs recorded were explained in the annual report as being due to delays caused by cleaning up the channel for the passage of ships. At times lumps appeared without warning in the canal bottom, between the passage of ships. These, however, were anticipated and sounded for by a dragline in charge of a survey party. The dredges went out into the channel to clear these away. The yardage per hour from the time the dredge went into commission until December 31, 1915, was 232.5 cubic yards. The yardage per work hour was 395.2 cubic yards, and the yardage per barrel of fuel oil was 95.7 cubic yards. For the year 1915 the "Gamboa" moved 2,473,310 cubic yards per hour or 416 cubic yards per work hour. This was a considerable improvement over her output in 1914.

The Year 1916

The year 1916 was notable principally for the record-breaking run of the "Cascadas" and the re-opening of the Canal for traffic. The "Gamboa" also broke her own record for a day's, a month's and a year's work.

The "Cascadas" made her great record output on February 18th. It still stands as the Panama and undoubtedly the world's record for a dipper dredge. We give below the details:

Total yardage	23,305 cubic yards
Elapsed time	24 hours
Actual digging time	23 hours, 15 minutes
Delay time	45 minutes
Yardage per hour, elapsed time	971 cubic yards
Yardage per work hour	1002.4 cubic yards
Average duration of cycle	53.8 seconds
Number of 1000-yard scows in service	9

Her record for seven days prior to and following her record run of February 18th was as follows:

	Cubic Yards		Cubic Yards
Feb. 12	13,240	Feb. 19	15,080
Feb. 13	12,760	Feb. 20	11,513
Feb. 14	9,315	Feb. 21	12,140
Feb. 15	10,465	Feb. 22	10,380
Feb. 16	15,985	Feb. 23	12,865
Feb. 17	10,540	Feb. 24	12,095
Feb. 18	23,305		

The average output per day for the thirteen days was 13,054 cubic yards as compared with 9642 for the "Paraiso's" record in October, 1915. The "Canal Record" for February 23, 1916, speaks of this record as follows:

"The new 15-yard dipper dredge, 'Cascadas,' excavated and loaded into scows on that day a total of 23,305 cubic yards of rock and earth. This is believed to be the world's record for a day's work by any kind of excavating machine in hard material.

"Taking its weight at 3,000 pounds to the cubic yard (approximately 110 pounds to the cubic foot), the weight of the material dug by the 'Cascadas' was approximately 35,000 tons. What is claimed to be the heaviest train ever hauled by one locomotive from Baltimore to Philadelphia, consisting of 55 cars of coal, carried 4,102 tons. The output of the 'Cascadas' on February 18th weighed more than the contents of eight such trains."

As stated, the dredge actually operated 23 hours and 15 minutes, 45 minutes being lost, due to delays, 35 minutes of this time being due to

waiting for scows and 10 minutes to tightening bolts on the dipper.

According to the "Canal Record" of March 1, during the 29-day month of February, the dredges working at the bases of the Culebra slides excavated a total of 1,039,950 cubic yards. The Bucyrus 15-yard dredge, "Cascadas," dug 330,605 cubic yards, a new high monthly record, and the Bucyrus "Gamboa," 293,230 cubic yards. The "Paraiso," the third of these Bucyrus dredges, excavated 236,235 cubic yards. The previous high monthly record was made during December by the "Cascadas," namely, 321,065 cubic yards.

The "Canal Record" for March 29, 1916, reports as follows in reference to the performance of the "Cascadas" from the time she was commissioned up to March 20, 1916:

"The 15-yard dipper dredge 'Cascadas' was placed in commission on October 31, 1915, and was in the cut continuously until March 20, when she was brought to the repair dock at Paraiso for

This slide completely blocked the Canal. The fleet of dredges are shown attacking it.

renewing the starboard spud. During that time, slightly over four and one-half months, the 'Cascadas' excavated 1,447,946.37 cubic yards, and was delayed 77 hours and 35 minutes. Her average excavation was 466.44 cu. yds. per hour, over a working period of 3,104 hours and 25 minutes.

"The dredge was engaged throughout in excavating rock. The loss of time from breakdowns was only 2.44 per cent of the total working time."

The Canal which had been closed to traffic since September, 1915, was re-opened on April 15, 1916, due to the excellent work of the dredges.

On July 28th the "Gamboa" broke her own record for a day's output as follows:

Total yardage.....15,425 cubic yards
Elapsed time.....24 hours
Actual digging time.....21 hours
Delay..... 3 hours
Yardage per hour elapsed time..642.7 cubic yards
Yardage per work hour.....734.5 cubic yards
Yardage per barrel fuel oil.....183. cubic yards
Duration of cycle.....73.5 seconds

On this occasion no attempt was made to break records until the last scow was under the dipper, when the operator was told that if he loaded this before midnight his highest previous record would be broken.

The figures below indicate the output of the "Gamboa" for six days preceding and for three days following her high day:

	Cubic Yards		Cubic Yards
July 22	11,230	July 28	15,425
July 23	13,490	July 29	14,375
July 24	12,390	July 30	11,010
July 26	13,735	July 31	10,785
July 27	13,990		

This indicates an average output of 12,828 cubic yards for the ten days which is close on the heels of the "Cascadas" 13-day average of 13,054 cubic yards.

In July of this year the "Gamboa" set up her own month's record, which was as follows:

Total yardage.....320,175 cubic yards
Elapsed time.....31 days
Actual digging time.....26 days, 20 minutes
Delays.....4 days, 23 hours, 40 minutes
Yardage per hour elapsed time..430.3 cubic yards
Yardage per work hour.....512.8 cubic yards
Yardage per barrel fuel oil.....132.4 cubic yards

When the figures for the fiscal year ending June 30, 1916, were published, the "Gamboa" was shown to have beaten her 12-months' record which is given below:

Total yardage.....3,097,226 cubic yards
Elapsed time.....366 days
Actual digging time..284 days, 6 hours, 5 minutes
Delays.....81 days, 17 hours, 55 minutes
Yardage per hour elapsed time..352.6 cubic yards
Yardage per work hour.....454. cubic yards
Yardage per barrel fuel oil.....122.6 cubic yards

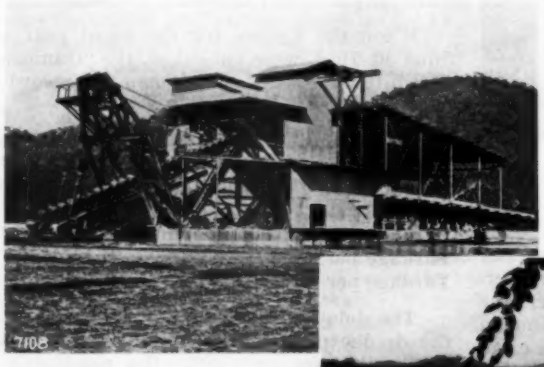
The delay time amounted to 22.3% of which the dredge proper, the engine room and deck is responsible for only 8%, the remaining being chargeable to boiler cleaning and miscellaneous tie-ups not the fault of the dredge.

With the year 1916, the big struggle ended. The three great dredges are still at work on the canal doing maintenance work, but the great period, when world's records went toppling month after month, have ended.

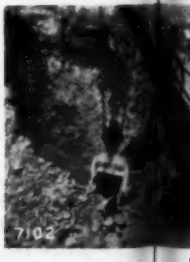
We believe that this log as set forth herein will stand as the world's standard for large dipper dredge operation for many years to come.

The accompanying views were taken at one of the gravel pits of the Great Northern Railway Company, where they have in operation a Bucyrus 30-B Diesel-operated shovel. The shovel was purchased for use in their various gravel pits to load gravel for ballast. The Diesel power unit was selected to eliminate coal and water troubles. At times when this machine has been moved from one pit to another, it was loaded on flat cars and moved without dismantling.

Bucyrus 70-C shovel owned by the [illegible] in operation on a railroad [illegible] the enlargement of Frogmore Yard [illegible] Railroad. The view was [illegible] to operator, who has been [illegible] shovel is shown loading [illegible]



Reproduced herewith is a recent photograph of the East Asiatic Industry Plantation Co., Ltd., 6-cubic-foot electrically operated Bucyrus placer dredge mining alluvial tin in the Pong Valley, Siam. This dredge has dug as high as 138,000 cubic yards per month, working three 8-hour shifts. The smaller view is general of the operations. The dredge may be seen in the distance.



The above three [illegible] show Corporation's 88-C Bucyrus [illegible] mounted on caterpillar [illegible] railroad grade reducing [illegible] work for the Illinois Central [illegible] City, Kentucky.

wned by the Dixie Contracting Company
road contract at Bemis, Tennessee, for
rogue Yards, on the Illinois Central
as sent to us by Mr. G. R. Hurd, the
n operating shovels for 25 years. The
g 12-yard Western dump cars.

W. A. Taylor's 20-B Bucyrus has been kept on the jump recently. The photograph above shows this machine lowering 36-inch terra cotta sewer pipe into a 5 x 5-foot trench at Siluria, Alabama. The trench was 250 feet long. The shovel started placing the pipe at 10:00 a. m. and completed the work at 3:00 p. m. the same day. The work was for the Buck Creek Cotton Mill Company. The trench, which was intended for a drain for the high school grounds, was through solid limestone and was dug by hand. The shovel excavated the material for backfilling from a borrow pit. The figure to the left is Brinley Evans, the foreman of the job.

Our other illustration shows the same machine just after it had completed a 3-mile journey under its own power from Siluria, which trip it made in 3 hours and 30 minutes. It is here shown ready to load sprawl for the Dixie Bee Line Highway at Keystone, Alabama.

We are indebted to Vader Roberts, its operator, for these views.

ows one of the States
-C Bucyrus railroad-type shovels
ently in use on their recent
reduction and curve elimination
ions Central Railroad at Central

A short time ago Los Angeles decided upon the question of a new library, with the result that $2,000,000 would be necessary to do the job in their traditional manner of doing things.

Construction is now well under way, ground having been broken on January 15th of this year at 5th Street and Grand Avenue on what is known as Normal Hill.

The grading work was done by C. G. Willis & Son, Los Angeles, at a contract price of $46,000. The views above show a section of the excavation being done by a Bucyrus 20-B ¾-yard shovel, with a view below of the architect's drawing of the new structure.

The Excavating Engineer

A Monthly Publication Devoted to Excavating and Allied Subjects

REGULAR SUBSCRIPTION:
$1.00 per year for 12 numbers; 50 cents for six months; or the equivalent in foreign currency at existing rate of exchange.
SPECIAL SUBSCRIPTION:
Upon application on card inserted in this number, subscriber's name will be placed on Rotating List, whereby he will receive The Excavating Engineer frequently (not regularly) free of charge.

THE
EXCAVATING ENGINEER PUBLISHING CO.
Bradlee Van Brunt, Manager and Editor
South Milwaukee, Wisconsin
Printed in the U. S. A.

Business Outlook

The indices of trade and industry tell of a larger volume of business in the first third of 1924 than in the corresponding third of 1923. Bank clearings, car loadings, employment reports, production figures, retail trade figures, agree in showing that more goods have been moving into consumption than ever before, a state of things very satisfactory not only from the business standpoint but in its significance as to general social conditions.

There are few reports of general unemployment, although certain industries, notably the manufacture of textiles and some kinds of clothing, are not running full. The manufacture of agricultural implements is reported as doing better than a year ago, but still suffering from the general agricultural depression.

Contracts for railroad equipment have been unexpectedly large, in view of the heavy purchases made last year and the efficient manner in which a heavy traffic has been handled.

Railroad construction work, furthermore, is more active than for many years past.

Thus it appears that the industries which are mainly depended upon to set the pace of prosperity have made a good start for the year. At no time, however, has the situation shown the symptoms of competitive buying or of inclination to anticipate future wants which were manifest during a few weeks of last spring. Apparently the business public is confirmed in its opinion that there is no danger of a scarcity of supplies or of runaway markets, and that the safe policy is to keep down both indebtedness and inventories. Sentiment evidently is sensitive to unfavorable symptoms, and in recent weeks there has been a noticeable slowing down, generally attributed to political agitation and some apprehensions that radicalism may be able to strengthen its position in national affairs through this year's elections.

That industry has been on a fairly stable basis over the past year is indicated by the comparatively slight price fluctuations. It is true that the early part of this year has been marked by falling prices, but economic conditions are now sound, so that, barring serious political developments, the price recession, which set in somewhat earlier this year than last, should be thoroughly stabilized by the time that this editorial appears in print.

For the immediate future the prospect is that industrial activity will continue at a high rate. The principal factors in last year's prosperity are still active. Eventually building operations at the present level of costs may be expected to fall off, but the decline is not yet in sight, and hardly will come before the latter part of this year at the earliest.

During each of the years 1921 and 1922 the total expenditures for all highway purposes, such as construction, maintenance, upkeep, including interest on borrowed money and miscellaneous items for all our public roads located outside the limits of incorporated towns and cities, according to Government figures amounted to approximately $1,000,000,000. Such data as are now available indicate that the expenditures for the year 1923 varied but little, and that in 1924 they will not vary materially, from this sum. The work directly controlled by the States will probably continue to increase as has been the case during recent years. The local work controlled by the counties, townships and districts may decrease somewhat, due to the agitation against bonds and highway taxes, but it is thought improbable that the decrease will be large.

The ever-increasing number of motor vehicles is constantly demanding more and better roads as well as better maintenance of existing roads. The motor vehicle is also directly and indirectly supplying more and more funds for highway work. The normal expectancy in regard to expenditures for our public roads would therefore seem to be that they will increase from year to year at least until the highway systems become sufficiently developed to meet fully the needs of this traffic.

Nothing Left

In Cornwall there was a case involving the ownership of an eight-day clock. After listening to the parties the judge said to the plaintiff: "You get the clock."

"What do I get?" complained the defendant.

"You get the eight days."

Village Constable (to man who had been knocked down by passing motorist): "You didn't see the number, but you could swear to the man?"

Villager: "I did, but I don't think 'e 'eard me."

· FIELD NOTES ·

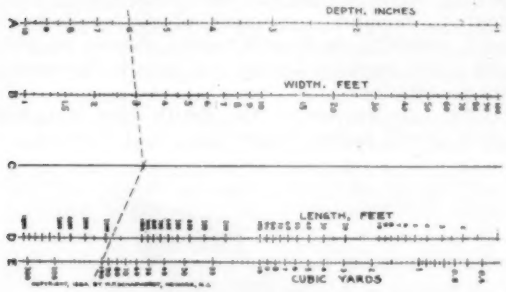
How Many Cubic Yards?

By W. F. Schaphorst, M. E.

Very often it is desired to compute the number of cubic yards in long, narrow, shallow excavations. The depth is then usually given in inches and the width and length in feet.

The chart herewith has been developed purposely to take care of excavations of that kind. The depth, Column A, is given in inches, while the width, Column B, and length, Column D, are given in feet.

Simply run two zigzag lines across the chart as indicated by the dotted lines, and the number of cubic yards is instantly given in Column E.



For example, the dotted lines drawn across the chart show that if we have an excavation 6 inches deep (Column A) by 3 feet wide (Column B) and 1800 feet long (Column D) the number of cubic yards will be found to be exactly 100.

Merely run a straight line through the 6, Column A, and the 3, Column B, and locate the intersection in Column C. Then from that point of intersection run through the 1800, Column D, with another straight line, and the intersection with Column E gives the answer as 100 cubic yards.

But that isn't all. The chart will also take care of deep excavations. Thus if the depth is 60 inches instead of 6 the same dotted line will give the answer as 1,000 cubic yards instead of 100. That is, if a digit is added in Column A, a digit must also be added in Column E. Likewise if a digit is added in Column B a digit must be added in Column E.

Thus the same dotted line would show that for an excavation 60 inches deep by 3 feet wide and 1800 feet long the number of cubic yards would be 1,000. Or, if the depth is 6 inches, width 300 feet, and the length 1800 feet, you will have to add two digits in Column E, because two digits were added to Column B, thereby giving us 10,000 cubic yards in Column E.

It is therefore evident that this chart will easily take care of almost any rectangular excavation, and it will give results that are surprisingly accurate.

Strength of Chains

From numerous experiments it has been ascertained that the strength of a chain link is 1.63 times the strength of the bar from which it is made. The strength referred to is the breaking or tensile strength. It is never safe to strain to the breaking point, because every time a piece of metal is strained to a point beyond its elastic limit it is permanently stretched and weakened.

For this reason it is never considered advisable to strain a chain to more than one-half the amount shown by the method given for computing the tensile strength. In other words the "proof test" of a chain should be about 50 per cent of the ultimate resistance of the weakest link.

Example

What is the safe working strength of a chain made from ½-inch wrought iron whose tensile strength is 40,000 lbs. per square inch?

Solution

Area=diam. square x .7854=.5 x .5 x .7854=.19635

.19635 x 40000=7854.

7854 x 1.63=12802 lbs.=ultimate breaking strength.

12802 x .50=6401 lbs.=proof test, or safe working strength.

A party of holiday-makers were paying their first visit to New York, and for one of their number the endless chain of buckets in a dredger at the docks seemed to possess a singular fascination.

While the others went off to enjoy themselves Archie would not budge an inch, but kept his eye firmly fixed on the dredger. Some hours later his friends found him still at the same spot.

"Archie," said one of them, "if you stay there much longer you'll miss the train."

"I don't care," was the reply. "I've counted 8,990 and I'm going to see the last of those buckets if I stay here all night!"

A local railroader was on his way home when stopped by a big husky fellow, who levels a 44 at his dome.

Railroader: "Whaten 'l you want?"

Robber: "We are going to play 'put and take.' You put up them mits of yourn and I'll take your coin."

A man went into Cohen's book store and asked: "Have you a copy of 'Who's Who and What's What,' by Jerome K. Jerome?"

Cohen replied: "No, sir, but ve got 'Who's Who and Vat's He's Got,' by Bradstreet."

DEVICES YOU OUGHT · TO KNOW ABOUT ·

A New Barber-Greene Ditcher

The Barber-Greene Company of Aurora, Illinois, just announce their latest model ditcher. This machine is a redesign of their former ditcher, being of greater strength and of greater simplicity. It is known as their Model 44-A Vertical-Boom Ditcher.

The machine weighs approximately 14,400 pounds in shipping condition, and will dig a trench of a maximum depth of 5 feet 6 inches. Booms are supplied for either 9-inch or 18-inch

Barber-Greene Model 44-A Vertical Boom Ditcher

width of trench. It is driven by a 4-cylinder, 38 horse power gasoline engine. The machine is mounted on crawlers and is equipped with three speeds for travelling on roads.

The vertical boom and the other basic features of design of the older machine have been maintained. The buckets, however, have been made deeper and have been equipped with sides. An interlocking arrangement has been provided in the bucket line, whereby in digging position the buckets rest upon one another, thus distributing the digging pressure along the whole line and preventing the bucket line from doubling in. Complete protection is afforded the digging boom by a new mechanical overload release sprocket. This sprocket does away with resort to the friction clutch or bolt safety device. It protects the machine from overload when obstructions of too heavy digging are encountered.

This machine is described in a new booklet published by the Barber-Greene Company, entitled "Modern Ditch Digging," which may be obtained by writing that company at Aurora, Illinois.

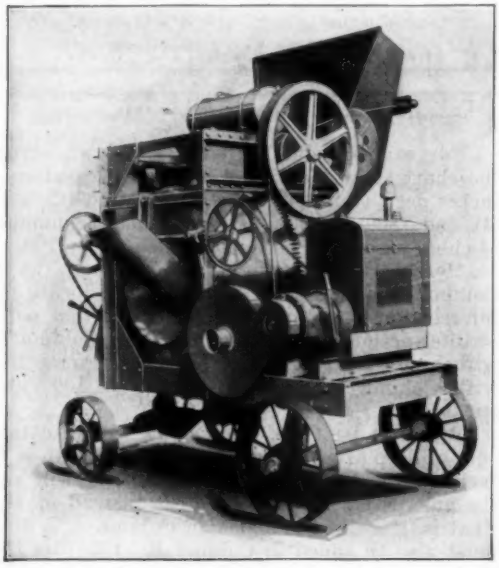
The Barber-Greene Company have just received an order from the State Highway Department of Pennsylvania for 34 gasoline-driven Type "U" Conveyors. These conveyors will be shipped during the month of April in one train load consisting of 29 cars. The machines will be shipped assembled.

These are the standard Barber-Greene Type "U" machines, "U" standing for Universal. The State Highway Department used one machine last year, and were so well pleased with its performance and adaptability that they ordered 34 more.

Smith 14-S 2-Bag Mixer

A new development of the Smith 14-S Non-Tilting Mixer is shown in the accompanying illustration. Greater compactness of construction permits mounting on shorter trucks, thereby making the entire machine lighter, and greatly increasing its portability.

The picture shows the Smith 14-S equipped with power loader, water tank and 15 h. p., 4-



Smith 14-S 2-Bag Mixer

cylinder Le Roi power unit. Strongly built gear guards protect the workmen, and at the same time prevent falling aggregate from dirtying and injuring the gears.

This is an ideal mixer for any construction job, whether large or small, having a two-bag capacity and giving a daily production of more than 150 cubic yards.

Small Light and Power Plant for Use Without Battery Developed by Westinghouse Company

A small light and power plant for use without a battery has been developed by the Westinghouse Electric & Manufacturing Company for service wherever the current can be turned directly into the line. The absence of the battery adds greatly to the ruggedness and portability of the plant, and it is particularly well suited for direct service or for auxiliary or standby service to supplement existing generating equipment in such places as oil and gas wells, mines and quarries, construction camps, lumber camps, pumping stations, brick yards, barges, boats and dredges, travelling shows, motion picture outfits, and for isolated sign boards.

The plant has a capacity of 1500 watts at 110 volts and operates on kerosene or natural gas. It consists of a gasoline engine and an electric generator built into a single compact unit. The engine is air-cooled, which makes it possible to install it in unheated places, is economical in oil and fuel consumption, is ruggedly constructed, and operates at a slow speed, providing for a long life under the most rigorous conditions. It has a capacity of 60 twenty-five watt lamps or about 1½ horse power.

A distinctive feature of the plant is its ease and simplicity of operation. There are no complicated adjustments or operations necessary for starting or stopping it, and no other attention is necessary while it is running except to keep the fuel and oil tanks supplied. The single-cylinder, four-cycle engine has a bore and stroke of 3⅜ by 5 inches. A fan in the flywheel draws air into the cylinder dome and over the cylinder fins, assuring cool operation under all conditions. The engine is lubricated by a splash feed system, which supplies an equal amount of oil to the moving parts at all times, regardless of the depth in the crankcase. This is accomplished by an oil carrying gear that dips into the oil in the crankcase and carries it to a pan, keeping the oil in this pan at a constant level. A simple Venturi mixing valve is used instead of the usual complicated carburetor. Fuel is drawn by suction to this valve from the six-gallon tank built into the base of the unit. A simple mechanical governor controls the speed of the engine by regulating both the fuel and the air. The 1500-watt, four-pole generator, which is bolted to the engine frame, is of the sleeve type on the engine shaft with no bearings. This unit conforms to the requirements of the Fire Underwriters.

SHOTS FROM THE FIRING LINE

Central States Notes

BY M. J. WOODHULL

W. B. Brodrick of Brodrick Bros. is now located at his camp site on the Burns Creek job near Gary, Indiana, and expects to start operations early in June with their Bucyrus Class-24 Diesel electric dragline.

Frank Loulan, operator, and John Porter, cranesman, just returned from the Dix Dam job at Burgin, Kentucky, where they were on a Bucyrus 78-C for L. E. Myers Co. Messrs. Loulan and Porter first operated one of the old Bucyrus 95-ton shovels on the Panama Canal.

Joseph Poupore of the firm of Davis & Poupore of Detroit, who recently landed a sewer contract in Detroit, was in Chicago a few days ago, and he expects to start their job in the near future, on which they will use their Bucyrus draglines.

S. A. Healy, the hustling contractor of Detroit, landed a big sewer job a few days ago, and will start his Bucyrus Class-72 trench excavator and Bucyrus 30-B dragline on the job within a few days.

C. F. Hamilton, vice-president of the Pyramid Coal Co. of Marion, Illinois, stopped off in Chicago recently. Mr. Hamilton is operating a Bucyrus 320-B stripper and a 50-B loader, and is shipping about 30 cars of coal per day.

"Dutch" Ziegenhagel, who has been operating W. J. Newman's Bucyrus 30-B shovel on the Sanitary District's job at Evanston, called a few days ago and was looking for a job on either a shovel or dragline, Diesel driven.

Florida

John Karner is pulling the levers on a Bucyrus 20-B at Jacksonville, Florida.

Idaho

Wm. T. Lundquist is operating a 70-C Bucyrus for the Christensen Construction Company on railroad work in Idaho. Geo. Western is craning and John Clark is firing.

Iowa and Missouri

BY W. G. PARROTTE

Bert Barlow is operating a Bucyrus 70-C for the Columbia Quarry Co. at St. Louis, Missouri. Barlow's present address is Columbia, Illinois.

Frank Gorman is operating an Erie-B for Andrew Shaeffer & Sons, St. Louis, Missouri. Frank hangs out at 4239 Chateau Avenue, St. Louis. John Borner is making the smoke and lives at 2523 South Broadway.

Jos. Ballinger Construction Co., 4040 Olive Street, St. Louis, was awarded the contract for the Jewish Hospital, a 31,000-yard job. They expect to finish the job in 60 days. They have one ¾-yard shovel with Walter Evans' fleet of 12 trucks. Neal Ballinger is pulling the levers on the shovel.

Al Wagoner and Sam Ballinger are operating the two shifts on the Marion 60 owned by the Missouri Portland Cement Co. at Prospect Hill, Missouri.

Bob Childers is pushing the levers on an Osgood-18 for the Advance Wrecking Co., St. Louis.

Bill Beauhuld is handling an Erie-B for the Bridge Asphalt Co., St. Louis. He resides at 2413 Elliot Avenue.

Frank Gorman is pulling the levers on one of Andrew Schaeffer's shovels. He has John Bormer making the steam for him.

J. A. Schaeffer Construction Co. just finished up a 10,000-yard basement job at 3600 Jefferson Avenue. Al Ballinger operated the shovel on this job and made short work of it.

Kentucky and West Virginia

BY F. M. GAYLORD

A. G. Boa, resident engineer on the Illinois Central Railroad work at Madisonville, Kentucky, reports favorable progress on the operations.

J. E. Davidson, superintendent of the E. L. Butler Clay Co., Mayfield, Kentucky, tells us that things are going nicely down there.

Walter Guyton is operating a Bucyrus 70-C at Corbin, Kentucky. He reports he likes it.

Bodie & Powell, Madisonville, are setting a pace stripping with their 80-B that is attracting a lot of attention.

The E. L. Butler Clay Co. have an outfit stripping at the Cooley pit. They are using gasoline dinkeys and are showing people how it should be done.

Max Parker & Sons Co. of Cincinnati, have secured a reservoir contract at Dayton that involves several hundred thousand yards.

Brown & Floyd of Charleston, West Virginia, have added a 70-C to their Elk River job to help out the 14-B and 20-B.

The Height of Something—The Kentucky banker who said, "Mr. Bucyrus must be a H--l of a big contractor. I see his name on equipment all over the country."

New York and Vicinity

BY T. A. BURNS

An $800,000 grading job of the Delaware, Lackawanna & Western Railroad Co. at Binghamton was awarded to the W. H. Gahagan Company.

Frederick Snare, Inc., has been awarded a 100,000-yard grading job by the New Jersey Central Railroad Co. at Elizabeth, New Jersey.

The New York Central has given Arthur Johnson the Deer Park work on the west shore near Kinston, New York. This job is said to amount to about $380,000.

We hear Mr. Hoppy of the Marion Company has made application for membership in the very exclusive steam club.

Mr. A. E. Albright is working for the U. G. T. Co. of Philadelphia, Pennsylvania, who have the contract for the Sofe Maple Dam being built by the Northern New York Utilities Company. They are just commencing to cut roads, draw lumber and build camps. This job is on Beaver River, seven miles from the village of Croghan in Lewis County, New York.

Northwestern States Notes

BY A. R. HANCE, PORTLAND, OREGON

The heaviest construction encountered on any highway project in Idaho for some time is found on a recent contract let in north Idaho for the construction of seven miles of road over what is known as "Laclede" Hill in Bonner County. The entire seven miles is through solid rock, the removal of which will cost $100,000 alone. The contract price for the entire grading and surfacing of the seven miles was $197,912 and E. A. Webster & Company was the successful bidder.

Contracts were recently awarded in Twin Falls, Idaho, to C. A. Robinson of Twin Falls for grading and graveling a span of approximately 23 miles on the Old Oregon Trail State Highway between pavement at Hansen and gravel road west of Burley, Idaho. Mr. Robinson's bids, aggregating, $150,165, were approximately $20,000 under the estimates of the State Highway engineers and about the same amount under the bids of the next low bidders.

State road construction projects totaling more than $1,000,000 will be inaugurated in northeastern Washington this spring. It is planned to have most of the work under construction by June 1st. Two other projects not included in the estimates will be opened next fall. This work includes the Rock Island-Columbia River job in Douglas County, amounting to approximately $150,000, and the Wells grade unit between Chelan and Pateros, estimated at $100,000. Projects to be started this spring include the Harvery and Daisy, Stevens County, units totaling approximately $40,000; Anglin, Okanogan County, $30,000; De Tillion, Stevens County, $100,000; Clark and Odessa, Lincoln County, $40,000 and $100,000, respectively; Carlton and Riverside to Omak, Okanogan County, $40,000 and $55,000; Orient, Ferry County, $200,000; Four Lakes, Skamania County, $120,000; Blueslide-Jared, Pend Orielle County, $100,000; Dryden and Peshastin in Chelan County; and a number of projects in Spokane County. A large part of the work is expected to be completed during the summer.

Tentative plans for the improvement of the roads in Mount Rainier National Park, as prepared by the Bureau of Public Roads, includes the improvement of six roads totaling about 25 miles of new construction, 56 miles of surfacing, 12½ miles of reconstruction work. This will include construction of several concrete bridges. Of the 81 miles of road which will result from activities, only 6½ miles of reconstruction section extends from the southeast entrance to the park to Longmire. With the paved road, Longmire will be accessible the year round, and the increased travel is expected to result in construction of a hotel and increased tourist facilities. About $500,000 will be expended on the road from Ipsut Creek bridge on the north, to the South Mowich River, a distance of 15 miles. From the south, the West Side Highway will reach up, to eventually meet the other road, a total distance of 43 miles. At least $600,000 will be required to complete the road. A short stretch of six miles, the White River Road, will cost $43,500, and will extend from Crystal Creek along the White River. It will be joined by nine miles of state-constructed highway, to be completed within the next two years.

The contract for the surfacing of 10 miles of the highway between Montpelier and Georgetown in Bear Lake County was let to George K. March of Spokane for $34,833.60, it was announced at Boise, Idaho, lately. There were eight bidders for the work, one of whom was the Board of County Commissioners of Bear Lake County. It is unusual for commissioners to bid on highway work. They bid more than $46,000, and the highest of the eight was more than $63,000.

A contract for construction of nine miles of road, known as Donohue Road No. 10, Adams County, was awarded to Mitchell Brothers, Spokane, their bid being $56,662.

The State Highway Commission of Montana has advertised for bids for the construction of the Harlem-Dodson Road, known as Federal Aid Project No. 152, beginning at Harlem and extending east across the Fort Belknap Reservation to Dodson, a distance of 28.44 miles. The work consists of grading, surfacing with crushed gravel, and construction of necessary minor drainage structures, in addition to nine bridges. This piece of highway work is one of the biggest projects that will be done in northern Montana this year, and when completed will cost more than a quarter of a million dollars, it is estimated. Except for about four miles at the Harlem end, and about the same on the Dodson end, the road lies wholly on the Fort Belknap Reservation, and that portion will be constructed entirely with government funds. The federal government will also pay 53 per cent of the cost of the work done off the reservation, the counties of Blaine and Phillips bearing 47 per cent of their respective shares, except that portion of the road which runs through the town of Harlem. Harlem will pay its 47 per cent where the road runs through the town limits. When this unit will be completed, it will mean that there will be about 150 miles of continuous highway extending from Dodson to Hingham, along the Roosevelt Trail. The above contract was awarded to Stevens Brothers of St. Paul, at a bid of $168,853.09.

Oklahoma

Chas. Hover is operating a clamshell for E. L. Terry, road contractor in Wilburton, Oklahoma.

Pacific Coast News

BY P. H. BIRCKHEAD, SAN FRANCISCO, CALIFORNIA

Contract awarded to Granite Construction Co., Watsonville, Santa Cruz County, who bid $23,638 for the improvement of Casserly Road, Pajaro Road District, work for Santa Cruz County. H. E. Miller is county clerk and Lloyd Bowman is county surveyor of Santa Cruz County.

Plans have been completed by State Highway Commission, Heroes Memorial Building, Carson City, Nevada, and bids will be called for shortly for the construction of the following projects: Elko County, 12.64 miles of gravel surfacing from Moor to Pequop Summit; Churchill County, 10.25 miles of 10-foot gravel surfacing from Westgate to Eastgate. Plans are being completed for the following projects: Clark County, 10 miles of gravel surfacing across Mormom Mesa; Humboldt County, 15½ miles of gravel surfacing from Winnemucca to Golconda; Humboldt County, 2.40 miles of gravel surfacing, City of Winnemucca; Clark County, 3.20 miles concrete and graveling surfacing, City of Las Vegas; Washoe County, 7 miles of concrete paving and gravel surfacing, Sparks to Hafed; Lyon County, 13 miles of gravel surfacing, Yerington to East County Line; Elko County, 17,20 miles of gravel surfacing from Pequop Summit to Silver Zone.

Contract has been awarded to Towhy Bros., Sharon Building, San Francisco, by the Pacific Electric Railroad Co., Pacific Electric Building, Los Angeles, for the construction of the Hill Street Tunnel in Los Angeles. The tunnel will be 4,230 feet in length, 28 feet wide, 22 feet high, and concrete lined, with a 500-foot cut at one end. A six-story reinforced concrete garage, 118 x 160 feet dimensions, will be erected. Total estimated cost between $3,000,000 and $4,000,000.

Plans are being prepared by the Engineering Department of the State Highway Commission, Forum Building, Sacramento, for the following highway projects, bids for which will probably be called for from time to time in the near future: Fresno County, 7 miles of gravel surfacing near Coalinga; Lassen County, 4.5 miles of asphalt macadam pavement from Susanville to Johnstonville; San Mateo County, 3.5 miles of macadam shoulders from Redwood City to the southerly boundary; Alameda County, 4.3 miles of concrete shoulders from Greenville to Livermore; Placer County, 8 miles of heavy grading near Colfax, averaging 40,000 cubic yards per mile; Solano County, 4 miles of concrete shoulders from Fairfield to Rockville; Yolo County, 12.8 miles of concrete shoulders from Woodland to Davis and near Putah Creek; San Joaquin County, 4.25 miles of 20-foot concrete pavement near Manteca, 4.7 miles of concrete pavement from southerly boundary of the County to Calla, 6.0 miles asphalt concrete pavement from French Camp to Mossdale, 8.0 miles of asphalt concrete pavement from Banta to westerly boundary of the County; Orange County, grading project between Newport Beach and Laguna; Tehama County, 12 miles heavy grading in Sacramento Canyon on the 130-mile road now partly under construction, 30 miles already under contract, about 65 miles of this highway will be through the Canyon and will average about 35,000 cubic yards of earthwork to the mile.

The following contracts have been awarded by the Southern Pacific Railroad Co. in connection with the construction of a 15-mile section of the Natron Cutoff in Oregon: 9-mile section awaded to Erickson-Petterson & Grier, Monadnock Building, San Francisco; 6-mile section awarded to Henry & McFee, Northern Life Building, Seattle.

Bonds voted by the City of El Centro, Imperial County, in amount of $275,000, for construction of a water storage project in Devils Canyon. Tentative plans for the work have been prepared by Consulting Engineer, F. C. Finkle, I. W. Hellman Building, Los Angeles and City Engineer, C. E. Johnson.

Plans are being made by county surveyor, Howard F. Cozzens, Salinas, Monterey County, and protests will be heard with reference to the construction of the proposed Carmel-Pacific Grove Road. Road is to be 5/16 miles in length and is estimated to cost $70,017. Protests are to be heard May 5th.

Contract awarded to Heafy, Moore & McNair, 2030 High Street, Fruitvale, Oakland, who bid $70,000 approximately for construction of improvements in Harmon Bell Tract, Piedmont, Alameda County, work consisting of 91,700 square feet macadam pavement, sewers, sidewalks, curbs, gutters, etc. E. C. Prather, Syndicate Building, Oakland, is Consulting Engineer.

City attorney of Stockton has been authorized by the City Council to prepare necessary papers for the holding of a bond election in the near future to vote on issuing bonds to the extent of $1,500,000 for flood control. It is proposed to build a large concrete dam below San Andreas to cost $1,400,000, and a restraining levee on Littlejohn Creek to cost $100,000.

Contract awarded to W. A. Bechtel, 625 Market Street, San Francisco, by the Western Pacific Railroad Co., for the construction of reinforced concrete shops, roundhouse, storehouse, engineers' house, etc., at the Stockton Terminal.

Pittsburgh and Vicinity

BY FRANK B. SMITH

A contract was let to the J. J. McCaughey Company for building one of the largest golf courses and also lagoons in Marquette Park. The total amount of yardage on this project is 600,000 yards, the cost being approximately half a million dollars.

Mr. Frank McCaughey is in charge of this work personally, and he has now a Bucyrus 14-B, also six elevated graders, eight Best and Holt tractors, with 140 head of mules.

Southern States News

BY C. N. BALLENTINE AND W. W. WHORLEY

Bids were opened on May 9th, in Nashville, Tennessee, on nine highway projects involving an expenditure of over one million dollars. According to Mr. J. G. Creveling, Jr., State Highway Commissioner, the next large letting will occur June 20th, at which time approximately two million dollars worth of work will be let.

State Aid Project 151-B, Coffee County, was awarded to Citizens Engineering Co., Savannah, Georgia, for the amount of $67,984.00.

State Aid Project 123-B, Putnam County, was awarded to Foster & Creighton Co., Nashville, Tennessee, for the amount of $165,710.00.

State Aid Project 166, Trousdale County, was awarded to Jefferson County Construction Company, Louisville, Kentucky, for the amount of $55,787.63.

Federal Aid Project 202, Warren County, (road contract) was awarded to Warren County Construction Co., Nashville, Tennessee, for the amount of $364,316.06.

Federal Aid Project 207, Loudon County, was awarded to R. L. Peters, of Knoxville, Tennessee, for the amount of $53,633.31.

State Aid Project 165, Crockett County, was awarded to D. M. Sparkman & Company, Dyersburg, Tennessee, for the amount of $47,048.06.

Federal Aid Project 204-A, Tipton County (bridge contract), was awarded to Montgomery & Parker, Rockport, Indiana, for the amount of $45,873.60.

Federal Aid Project 204-A, Tipton County, was awarded to D. M. Sparkman & Co., Dyersburg, Tennessee, for the amount of $38,107.14.

Formal approval was given the Central of Georgia Railway Company by the Interstate Commerce Commission on May 6th to proceed with its eastbound grade revision program between Columbus, Georgia, and Birmingham, Alabama. The following is a list of the successful bidders on this work, who are making every effort to begin the actual construction as soon as possible: Sections 1, 2, 3, H. M. Luck; Sections 4, 5, 6, 12, 13, 14, 15, 16, 17, Brooks-Callaway Company; Sections 7, 8, O'Brien Construction Company; Section 9, Hardaway Contracting Company; Section 10, John A. Kreis; Section 11, Nichols Contracting Company.

C. E. Herring is operating a Bucyrus 14-B for the O'Brien Construction Company at Roan Mountain, Tennessee. Barnett Blackwell is keeping things hot.

R. L. (Bob) Lane dropped in to see us recently. Bob has been working for the Asheville Construction Company and is now anxious to locate in the Birmingham district.

E. R. Cooper has been operating a 70-C for the L. E. Myers Co., Burgin, Kentucky, and is now overhauling a 45-ton Bucyrus for the Dempster Equipment Company.

J. D. Morris, who has been handling a big stripper for the Harris Collieries, is now with L. E. Myers Company, Burgin, Kentucky.

L. A. Guillaume, an old-time shovel operator, visited this office recently. Mr. Guillaume has been operating in the Florida fields recently, and has had a wide experience. Anyone desiring a good operator, or construction man, can reach him at Mulberry, Florida.

St. Louis Items

BY A. B. KOENIG

Cameron, Joyce & Co. are making rapid progress with their grading, paving and culvert work on Sections 29, 32 and 34, Route 3, Warren County, Illinois. They have 12 miles in three sections there. Mr. R. F. Haupt, the managing partner, is in charge of this work and informs us he has enough there to keep him busy for the balance of the season. They are working their own equipment on this job.

The State Department of Public Works and Buildings of Illinois awarded contract to H. C. Neiland of Monee, Illinois, for the construction of one reinforced concrete girder bridge and one reinforced concrete box culvert on Section 1, Route 43-a, in Menard County, for $10,646. The contract for the grading of this section was awarded some time ago. The section starts on the Springfield-Peoria hard road, two and one-half miles north of Athens and runs to Petersburg.

G. N. Cooper, 711 Grand Court, Davenport, Iowa, reports his nine-team outfit about idle there. He wants any kind of grading in this part of the country.

The Harrison Engineering and Construction Corporation of Kansas City was awarded the contract for pavement on Route 25, in Champaign County, Illinois, for $276,432.20.

Wm. O'Neil Sons Co., Inc., Fairbault, Minnesota, sublet 56,000 yards of grading in Mercer County, Illinois.

The new water system of Jerseyville, Illinois, is rapidly nearing completion. The pipe line has been completed and the connections with the city water mains made. The power plant will be ready to begin forcing water over the seven-mile line of piping in a couple of weeks. The wrecking of the present old power plant at the city's old artesian wells will begin this week.

The Industrial Track Construction Co. have opened a branch office in Room 219, Monadnock Block, Chicago, with E. R. McCracken in charge. Mr. McCracken will be pleased to figure on any kind of track or grading work in this vicinity.

The Santa Fe Railroad plans to lay with heavier steel and reballast its entire Oklahoma Eastern Branch in preparation for their new short line service to Kansas City. The short line will be completed with an extension from Copan, Kansas, across Osage County to connect with the Eastern Division at Ralston.

The Herrick Construction Company of Carlinville, Illinois, has been awarded the contract by the State Department of Public Works and Buildings for constructing the bridges on Section 12 and 13, Route 36, in Adams County, Illinois, for $65,332.

Dave Keating will finish his road work near Carmi, Illinois, in a couple of weeks.

James F. Quinlivan, president of the James F. Quinlivan and Brother Feed Company, died here Friday, April 25th. Mr. Quinlivan was one of the best-known feed men in this part of the country among contractors. He is survived by his widow, one son, a brother and three sisters.

Jim Van Meter of Whelen Springs, Arkansas, has been awarded a contract for the building of a railroad dump at Reader, which will be used for additional trackage to take care of oil shipments from the Nevada County oil fields that are expected in the near future. The contract is said to entail a large expenditure. The Mansfield Hardwood Lumber Company, which is building a road to the oil fields, has laid steel to within three miles of oil now in storage waiting the railroad's completion.

The Park Board, meeting at Kansas City, Missouri, April 24th, awarded a contract to Harrington, Howard & Ash, civil engineers, to prepare plans and estimates for a viaduct to carry Washington Park Boulevard across the Blue Valley. E. E. Howard, one of the members of the firm, estimated that the viaduct would cost approximately one million dollars.

The Wabash Railroad Company has purchased a building site in Columbia, Missouri, and will erect a freight depot, warehouse and extension tracks. It is expected that work will be started about August 1, when possession to the property will be given.

W. M. Burton, 709 South 27th Street, Omaha, has a ten-team and machine outfit idle.

C. L. Hager, Walnut Ridge, Arkansas, was awarded the contract of paving and graveling the streets located in Street Improvement District No. 2, said work to commence about May 15th.

Trompeter & Sons of Peru, Illinois, was awarded the contract by the State Department of Public Works and Buildings for the heavy grading on Section 1-a, Route 42-a, in Menard County, Illinois. The bid of this firm was $38,711. The section runs from the Springfield-Peoria hard road at a point two and one-half miles north of Athens, west to Petersburg, a distance of 5.30 miles. Lee Gallagher & Son of Lincoln, Illinois, was awarded the contract for grading Section 54-a, Route 2, in DeWitt County, Illinois, for $11,994. The section is in the northern part of the county.

The Kinkel Construction Co. received contract for pavement on Route 3, Sections 82 and 83, in Morgan and Scott Counties, Illinois.

Luck Bros. Company, 403 Rialto Building, Kansas City, Missouri, will finish their work in Memphis, Tennessee, in about a month. They will have two shovels and two draglines idle that they would like to place on another job when through there.

The Nelson Construction Co., 620 South State Street, Jerseyville, Illinois, has incorporated to do general construction business. The capital stock is $100,000, which has been subscribed and paid as follows: C. M. Hanes, $25,000; Edward Nelson, $25,000; Karl T. Nelson, $25,000; P. J. Fleming, $12,500; and W. J. Chapman, $12,500.

McAndrews & Hannahs were awarded contract for three sections of grading in Adams County, Illinois, for $158,500.

The Edwardsville Construction Co., Edwardsville, Illinois, have 15,000 yards of grading near Alton, Illinois, to sublet. This work is suitable for about a ten-team outfit.

The Oliver Construction Co. of Little Rock, Arkansas, received contract for bridge substructure on the Little Rock-Hot Springs Highway on a bid of $81,171. The contract for steel bridges was awarded to Leroy Johnson.

At a meeting of about forty property owners held at Pine Bluff, Arkansas, on April 29th, plans for the building of a road from the north end of the free bridge to a connection with the road being built in the Plum Bayou Section, a few miles north of Pastoria, were abandoned.

Wm. T. Ogle has his outfit at work on a grading job north of the city.

Fred Hume, New Florence, Missouri, wants fifteen teams to haul clay for brick yard purposes.

The Houston Construction Co. was awarded contract for hard surfacing the Little Rock-Hot Springs Highway from Red Gates to Benton, Arkansas.

The Koss Construction Co. will hard surface the Little Rock-Hot Springs Highway between Benton and Hot Springs, Arkansas. Contract awarded May 2nd.

Contractors when in want of work or labor for their outfits write or wire Koenig Labor Agency, 612 Walnut Street, St. Louis, or 501 Delaware Street, Kansas City, Missouri.

Bids totaling $45,000 less than the preliminary estimates prepared for the improvement of nine streets were received May 6th by the Board of Public Service. The total cost of the work bid for will be $204,200.75, while the Engineering Department estimated that the cost would approximate $249,500. The Central Paving and Construction Co. were the successful bidders on three of the streets, Chouteau and Manchester Avenues from Vandeventer Avenue to Kingshighway Boulevard, Ohio Avenue from Geyer to Lafayette Avenues and Beacon Avenue from Prange to Lillian Avenues. The bids were for a total of $72,047.10.

The Granite Bituminous Paving Co. was the low bidder on four streets, Wyoming Street from Morgan Ford to Alfred Avenue, Arlington Avenue from West Florissant to Harney Avenues, Margaretta Avenue from Cora to Marcus Avenues and San Francisco Avenue from Red Bud to Newstead Avenues, for a total of $77,505.65. The bids were the only ones which exceeded the preliminary estimates.

Other bidders were the Webb-Kunze Construction Co. which bid lowest on the paving of Sulphur Avenue from Southwest to Columbia Avenues, for $17,662.50, and the Trinidad Asphalt Manufacturing Co. which would complete Bell Avenue from Grand Boulevard to Vandeventer Avenue for $37,085.50.

Pete Sugart and Blythe Bros. were awarded the contract for double tracking the Illinois Central Railroad between Belleville and Pinckneyville, Illinois, a distance of 39 miles. They have 500,000 yards of nice team work to let in quantities to suit outfits. Write Pete Sugart, Nevada, Iowa, or Blythe Bros. at Logan, Illinois, where they have their own outfit at work on another Illinois Central job.

Blythe Bros. can use a small shovel and car outfit on Illinois Central Railroad at Tilden, Illinois. Write them Logan, Illinois.

W. E. Callahan Construction Co. have opened a branch office here in Room 401, Liberty Central Trust Building, with Paul Grafe in charge.

Bill Ross has a team outfit at work on State Highway No. 2, near Blue Springs, Missouri.

Albert Hood is moving his outfit to Kansas City, Kansas. He is grading in the industrial district.

Massman Construction Co. have two revetment jobs on the Missouri Pacific between Kansas City, Missouri, and Atchison, Kansas.

Woods Bros. are busy constructing settling vats at Kansas City, Kansas. Casey, in charge, also have a revetment job for the Union Pacific Railroad at Kansas City, Kansas.

John Mulvill of Mulvill Bros. of Alton, lost his left leg below the knee, when he was struck by a fast freight on the Chicago & Alton Railroad, at Plainview, north of Alton, May 8th. Mulvill was in charge of laying a double track for the Chicago & Alton. The new track had just been completed, but had not been placed in service. For some reason the northbound train was routed over the new track and Mulvill did not hear its approach until it was too late. His leg was badly mangled and amputation was made necessary at St. Joseph's Hospital in Alton, where the injured man was moved.

While in Kansas City the writer interviewed the Grand Juryman, J. W. McMurry of the J. W. McMurry Contracting Co. Mack was a busy man attending meetings of the Grand Jury and looking after his contracts, but found time to entertain us during his spare moments. At present they have three concrete jobs on the Wabash Railroad, three small jobs on the Frisco, a nice piece of work on the Missouri, Kansas & Texas Railroad near Eufala, Oklahoma, protecting and reconstructing the embankment that was washed out by the flood of 1923. They were also awarded contract for reinforcing and rebuilding the 12th Street Bridge in Kansas City, Kansas, a $250,000 job. Mr. McMurry is ably assisted by Roger Faubin, who is taking care of the outside work.

Ed White is resting up in Kansas City. Lots of work in sight. Hope you are right Ed.

The Kaw Paving Co. of Topeka, Kansas, were awarded contract for paving eleven blocks in the business district of Rogers, Arkansas, on a bid of $100,853.17. The contract calls for 6-inch concrete base, one inch of sand, a layer of vitrified brick over an inch of asphalt.

James T. Morgan was awarded contract for the completion of the Auditorium of high school building at Hillsboro, Illinois.

Joseph Sampson, Fairbault, Minnesota, has 200,000 yards of good road work near Rochester, Minnesota, to sublet.

Harrington Bros. moved their team outfit to Clayton, Missouri, on grading property.

Canada

Vancouver and Vicinity

BY J. C. MOON

Conditions in the logging camps and saw mills are somewhat unsettled as export orders have fallen off and there are a great number of logs in the water. The logging companies have decided to curtail their operations considerably until conditions are better which will probably be in about three months' time.

Several small paving contracts have been let recently, one for asphaltic concrete in the city to the Cotton Co., Ltd., and the A. B. Palmer Co. are busy on a similar job at Armstrong, British Columbia, whilst the General Construction Co., Ltd., are hard surfacing some roads for the Delta District.

W. H. Wiesdepp & A. B. Campbell have secured a subcontract from Smith Bros. & Wilson, Ltd., for excavation for the power house at the new University of British Columbia. They have secured the use of a shovel and expect to be through in about six weeks.

Work on the new Transprovincial Highway will be delayed till later in the year owing to the political situation. It appears that the election will take place about the end of June and it is not expected that any contract will be let until it is over.

Tenders are being called for laying of sewers in connection with a portion of the new residential district at University site at Point Grey; this work will amount to about $100,000.00, and this contract will be let at an early date.

Tenders closed on the Alouette Stave Lake Tunnel for the British Columbia Electric Railway Co., and contract will be awarded at an early date; ten bids were received and it is understood that the cost will be about $360,000.00.

TRADE NOTES

New Half-Million Dollar Westinghouse Plant in California

The Westinghouse Electric and Manufacturing Company has awarded a contract to the Dinwiddie Construction Company of San Francisco for the construction of a second large building unit on the twelve-acre plot of ground owned by the Westinghouse Company in Emeryville, California. This new plant when completed will cost close to $500,000, and will give employment to a large number of people. The new building will provide accommodations for a large assembling shop, extensive service and repair shops, a zone warehouse, and various other facilities designed to render Westinghouse products and service more accessible and efficient to customers in the West.

1923 Was Record Year for High Explosives

Figures just issued by the United States Bureau of Mines show that during the year 1923 more high explosives for industrial uses were produced in the United States than ever before. The total reached 327,776,534 pounds. There was in addition about 15,000,000 pounds of excess government-owned explosives distributed. Manufacturers estimate also that 18,500,000 pounds were exported, making a grand total of 361,276,534 pounds manufactured in the United States. The largest amount produced in any previous year was in 1917 when 330,000,000 pounds were produced for commercial purposes.

Herbert J. Desson, manager of the Detroit Office of the Blaw-Knox Company, died after a brief illness, on Wednesday morning, April 16th, at the age of forty-four years. Mr. Desson was born in Cleveland and received his general education in the public schools of that city. He came with the Blaw-Knox Company in 1916, and three years later was placed in charge of the company's Detroit Branch.

Irving A. Pfeil, of the Chicago office of the Blaw-Knox Company, has been appointed manager of the company's Detroit branch, succeeding Herbert J. Desson, who died recently. Mr. Pfeil graduated in civil engineering at Ohio Northern University. During the World War he served as lieutenant in the Aviation section. He has been with the Blaw-Knox Company since 1919.

Highway transportation in the South will develop as rapidly proportionally, as the expansion of the road-building program, which is now well under way in the Southern states. This is the conclusion reached by V. H. Day, general sales manager, the General Motors Truck Company, who has just returned from a trip through the Central South.

"The industries of the South are operating on a sound economic basis and optimism is universally prevalent," says Mr. Day. "Highway transportation is showing a rapid growth, due to the extensive roadbuilding program. A wider use of motorized transportation is anticipated with the establishing of substantial highways, connecting all of the mercantile centers with the producing districts.

"The confidence of the Central South in its economic enterprises is most strikingly reflected at present in its flourishing building program. Business and residence building is at high ebb everywhere."

Mr. W. L. Day, president and general manager of the General Motors Truck Company, announces that on May 15th the executive force of the home office at Pontiac is to be strengthened by bringing to headquarters Otto E. Stoll, who for several years has been a vice-president of the company in charge of the New York branch and the eastern territory.

Mr. Stoll comes to the home office to relieve Mr. Day of some of his duties. He will assume the duties of general manager, with Mr. Day, the head of the organization, as president. Mr. Stoll has been with the General Motors Truck Company since its beginning.

His long experience in the truck business and his excellent executive ability well qualify him for his new position, which is a well-earned promotion, officials announced.

Mr. Day, in addition to his position as president of the General Motors Truck Company, is a vice-president and director of the General Motors corporation.

8,000,000 Kegs of Powder Used in 1923

More than 8,000,000 kegs of blasting powder were used during 1923 for commercial purposes in the United States, according to figures just issued by the United States Bureau of Mines. Approximately 86% of the total consumption was employed in coal mining. Of the more than 8,000,000 kegs produced, 5,732,142 kegs were used in six states. Pennsylvania consumed 1,565,103 kegs; Illinois, 1,487,193; Indiana, 853,764; Kentucky, 687,207; West Virginia, 592,682; and Ohio 546,193.

January first you're rearing to GO;
About the tenth it starts in to snow.
Now comes the fifteenth with a great big thaw,
Everything mud, but the wind seems raw.
It breaks on the twentieth and to zero goes,
You spend a half day thawing the shovel hose.
By the thirtieth it's frooze solid to the bottom of the well:
Grading in January sure is H--l.

— *Highway Builder.*

OIL ENGINE DRIVE FOR DRAGLINES AND DITCHING DREDGES

RANDOLPH-PERKINS COMPANY
Geo. B. Massey, Vice President
1216 First National Bank Bldg.
CHICAGO

Hayward Buckets

Performance Tells the Story

AND performance is a definite quality of Hayward Buckets that can be measured in dollars earned *every day of operation.*

For Hayward Buckets have proved their dependability and ruggedness on jobs where operating conditions demanded exceptional service.

Back of Hayward design is the accumulated experience of over 40 years in making Grab Buckets for every purpose.

Tell us the kind of work you do, and we will send an interesting booklet relating to your particular problem.

THE HAYWARD COMPANY
52-54 Church Street New York, N. Y.

Builders of Clamshell, Orange Peel, Drag Scraper and Electric Motor Buckets

Trade HAYCO Mark

2930-Y

Illustration Number Five

TESTING THE FINISHED CHAIN

After the chain is finished it is proof-tested (using a Standard Riehle Bros. Testing Machine) to figures shown in our catalog. The load applied according to size of chain, also safe-working load and approximate breaking strains, are given on pages 9 and 10. If you do not have a copy, send for same.

TAYLOR MESABA STEAM SHOVEL CHAIN

Manufactured by (ESTABLISHED 1873)

S. G. TAYLOR CHAIN CO.

641 MARQUETTE BUILDING, CHICAGO, ILLINOIS

For convenience in making inquiry use postal inserted in this number.

The Excavating Engineer

Ten Cents Per Copy **PUBLISHED MONTHLY** **One Dollar Per Year**

Vol. 18 **MILWAUKEE, JULY 1924** **No. 7**

CONTENTS

Front Cover Illustration

View showing the construction of the Twin-States Gas & Electric Company's hydro-electric power plant at Gorham, New Hampshire. The Bucyrus 20-B ¾-yard shovel is shown in the midst of heavy boulders.

Articles

Here's a Highway Job That Isn't All Roses.255
Quarrying Building Stone in Ontario.....257
Tying the Sack Before It Is Filled.....258
Harnessing the Androscoggin for More Power.259
Digging Sand and Gravel from the South Platte River in Colorado.....261
Know Your Truck Costs — I.....268

Editorials

What Is Horse Power?.....266
L. A. Desy.....266
Arizona Rejoices.....267

Photographs from the Field 264-265

Field Notes

Economizing in Space in Digging a Shallow Sewer 267
One Reason why Gears Wear Out.....267
Some "Don'ts" for Rock Excavation.....268

Devices You Ought to Know About

Bucyrus Company Announces Another Diesel Shovel and Dragline Excavator.....268
Hansen Automatic Dragline Bucket.....269
Bucyrus Company Announces Trailer for Loading and Moving Small Revolving Shovels 269

Shots from the Firing Line 270-275

Trade Notes 275-276

Review of Books & Catalogues 276

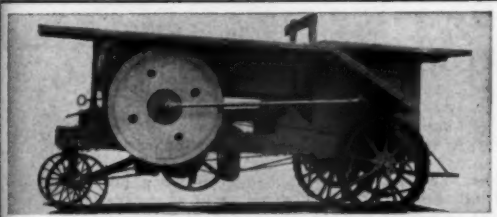
ADDRESS ALL COMMUNICATIONS TO

THE EXCAVATING ENGINEER PUBLISHING COMPANY

BRADLEE VAN BRUNT, Manager and Editor

SOUTH MILWAUKEE **WISCONSIN, U. S. A.**

Copyright 1924 by the Excavating Engineer Publishing Co.



THE LATE IMPROVED LOOMIS "CLIPPER"

The most wonderfully efficient **Blast Hole Drill** produced! It is faultless, simple, durable, easily maintained, it commands your investigation. Days are not too long nor rock too hard for this famous Drill. There is a reason why it predominates.

THE LOOMIS MACHINE CO., (Established 1842) **K Street, Tiffin, Ohio**

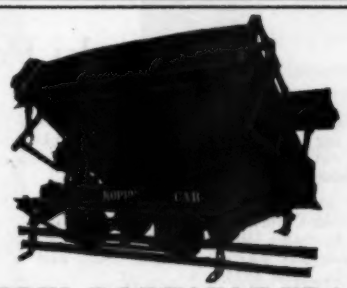
Send for BULLETIN No. 6 on La Plant-Choate Trailers

This bulletin illustrates our big 5-yard, all-steel tractor trailer, built to carry a 10-ton load and move materials economically.

We manufacture a complete line of heavy-duty trailers, platform and dump trailers to be operated with modern tractors. We also manufacture special steel wheels and running gear for mounting equipment. Wire us for prices.

La Plant-Choate Mfg. Company

3112 First Avenue **Cedar Rapids, Iowa**



KOPPEL PORTABLE TRACK, SWITCHES, DUMP CARS, ETC.,

are indispensable requirements for up-to-date contractors.

We specialize in the manufacture of Portable Track, Switches, Turnouts, Road Trucks, Batch Boxes, Cradle and Rocker Cars, Square Box Dump Cars, etc.

Bulletin 301 on request

Koppel Industrial Car and Equipment Co.

KOPPEL, PENNSYLVANIA

TRADE MARK REG. U.S. PAT. & PATENT OFFICE

KOPPEL

SALES OFFICES:

New York, Pittsburgh, Detroit, Chicago

For convenience in making inquiry use postal inserted in this number.

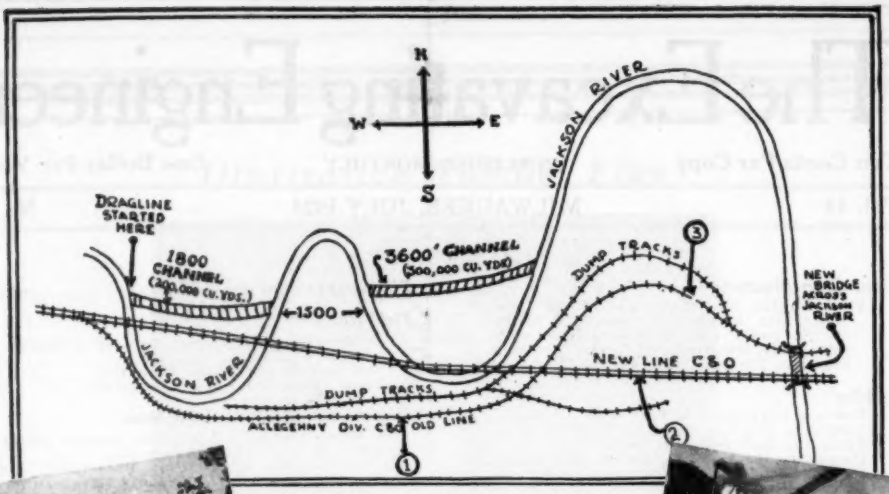


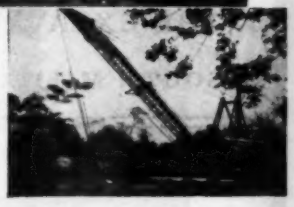
Diagram showing changes under way by Chesapeake & Ohio Railway at Clifton Forge, Va.

Dump in Jackson River to make bed for new main line. See Point 1 in Diagram.

Dragline in operation.

Operation for 300-foot Jackson River bridge.

Changing a River's Course with du Pont Explosives



Dragline mounted on trucks crossing Jackson River.

NOWADAYS engineers and contractors think nothing of straightening out the kinks in a river's course or removing a hill or two from one part of the landscape to another.

But in an operation of this kind at Clifton Forge, Va., the Brooks-Callaway Company, of Atlanta, is undertaking a real he-man's job for the Chesapeake & Ohio Railway. This job was started in April 1923, and will be completed in April 1925.

The excavation work includes about 2,200,000 cubic yards within less than two miles, a reduction in the curvature of the main line, the cutting of 5,400 feet of river channel and the construction of a 24-track concrete bridge 300 feet long. By this operation the present railroad yards will be increased from 43 to 66 miles of track.

The new Jackson River channel is being made with a dragline — about 500,000 cubic yards of excavation. The rock bottom of the channel is blasted to a depth of 7 or 8 feet, and the channel will have a 100-foot bottom and a 1 to 1 slope. W. W. Boxley & Company, of Roanoke, Va., subcontracted the 30,000 cubic yards of concrete work for the Jackson River bridge.

Du Pont explosives and blasting accessories are being used exclusively, as in hundreds of other important operations throughout the country.

E. I. DU PONT DE NEMOURS & CO., Inc.
***Explosives Department*, Wilmington, Delaware**

Branch Offices:
Birmingham - - Ala.
Boston - - - Mass.
Buffalo - - - N. Y.
Chicago - - - - Ill.
Denver - - - Colo.
Duluth - - - Minn.
El Paso - - - - Tex
Huntington - - W. Va.
Kansas City - - Mo.
Mexico City - - Mex.

DU PONT EXPLOSIVES

Branch Offices:
New York - - N. Y.
Pittsburgh - - - Pa.
Portland - - - Ore.
St. Louis - - - Mo.
San Francisco - Calif.
Scranton - - - Pa.
Seattle - - - Wash.
Spokane - - - Wash.
Springfield - - - Ill.
Du Pont Products Exhibit, Atlantic City, N. J.

For convenience in making inquiry use postal inserted in this number.

Hammer Type

Rock Drills

A FEW operators bought their first CP Rock Drills as a matter of experiment while records of satisfactory performance in similar work encouraged many others to install CP drilling equipment.

Additional CP Rock Drills have followed these original installations solely upon the merits and work accomplished by the first few CP Drills placed in operation.

It is a rule, rather than an exception, that today these same operators prefer CP Rock Drills when they are either enlarging their present rock drill equipment or are replacing obsolete and inefficient drills with modern economical types.

CP Rock Drills have many features that should be considered in your decision of rock drill installation. Their ability to withstand severe use with economy of maintenance and operation is one of their many good points.

Other factors are given detailed explanation in Special Publication 697.

Write for your copy.

Chicago Pneumatic Tool Company

6 East 44th Street, NEW YORK, N. Y.

*Sales and *Service Branches all over the World*

*Birmingham	*Cleveland	Houston	*New York	Salt Lake City	Tulsa	Brussels	Havana	London	Montreal	Rotterdam	Shanghai	*Vancouver
*Boston	Denver	*Los Angeles	*Philadelphia	*San Francisco	Basle	*Buenos Aires	Helsingfors	Manila	Osaka	Santiago	Tampico	*Winnipeg
*Chicago	*Detroit	*Minneapolis	*Pittsburgh	Seattle	Berlin	Christiania	Honolulu	Milan	Paris	*Sao Paulo	Tokyo	
*Cincinnati	El Paso	*New Orleans	Richmond	*St. Louis	Bombay	Dairen	Johannesburg	*Montevideo	*Rio de Janeiro	Seoul	*Toronto	

Canadian Pneumatic Tool Company, Ltd., Montreal, manufacturers of Chicago Pneumatic products in Canada.

B-22

BOYER PNEUMATIC HAMMERS··LITTLE GIANT PNEUMATIC AND ELECTRIC TOOLS
CHICAGO PNEUMATIC AIR COMPRESSORS··VACUUM PUMPS··PNEUMATIC HOISTS
GIANT OIL AND GAS ENGINES ROCK DRILLS ·· COAL DRILLS

CHICAGO *Rock* **PNEUMATIC** *Drills*

View of Rock Fill Made by the Bucyrus 14-B

The Bucyrus 14-B Loading Dump Cars

In this cut the 20-B Bucyrus had to recast the material excavated by the Bucyrus 70-C. It was some job for the little machine, but it did the work successfully.

Between dump trains. Tom Eakew, the operator, on the 70-C and Had Searls, craneman. Mr. Floyd is standing near the dipper.

Bucyrus 20-B Cleaning Off Railroad Right-of-Way After Blast

The Bucyrus 70-C at Right, and 14-B at Left Loading into 12-yard Western Dump Cars

The 70-C in the foreground. The small shovel, a Bucyrus 20-B, is shown cleaning off the tracks after a blast, and overcasting the material into the river alongside the railroad right-of-way.

Views of Brown & Floyd's Big Road Job with the West Virginia State Highway Commission